

What is claimed is:

1 In a processing satellite communications system
2 including at least one processing satellite having a receiver
3 and a transmitter for respectively receiving and transmitting
4 a data cell, a method for virtual path switching of said data
5 cell, the method comprising:

6 receiving a data cell at one of a plurality of input
7 ports of said processing satellite;

8 examining an assigned virtual path identifier (VPI) in
9 said data cell to determine a destination output port
10 associated with said assigned VPI; and

11 transferring said data cell to said destination output
12 port.

1 2. The method for virtual path switching of claim 1
2 comprising associating said destination output port with a
3 crosslink to another processing satellite.

1 3. The method for virtual path switching of claim 1
2 further comprising:

3 establishing a set of VPIs wherein each VPI is uniquely
4 associated with a single output port on said processing
5 satellite;

6 establishing a set of virtual channel identifiers (VCIs);

7 assigning said assigned VPI from said set of VPIs and a
8 VCI from said set of VCIs to said data cell; and

9 transmitting said data cell to said processing satellite.

1 4. The method for virtual path switching of claim 1
 2 further comprising:
 3 establishing at least one control subfield indicating a
 4 distinct treatment for data cells;
 5 establishing at least one routing subfield corresponding
 6 to one of said output ports; and
 7 dividing said assigned VPI into a control subfield and a
 8 routing subfield.

1 5. The method for virtual path switching of claim 4
 2 wherein said examining step comprises examining said routing
 3 subfield to determine said destination output port.

1 6. The method for virtual path switching of claim 5
 2 further comprising examining said control subfield to
 3 determine a level of error control for said data cell.

1 7. The method for virtual path switching of claim 5
 2 further comprising examining said control subfield to
 3 determine a level of output queuing priority for said data
 4 cell.

1 8. The method for virtual path switching of claim 1
 2 further comprising:
 3 providing at least one multicast module on said
 4 processing satellite wherein said multicast module is

5 associated with one multicast output port; and
6 providing at least one multicast routing table having
7 memory locations storing addressing information.

1 9. The method for virtual path switching of claim 8
2 further comprising:
3 establishing a set of VPIs wherein each VPI is uniquely
4 associated with a single output port on said processing
5 satellite, and wherein at least one of said VPIs is a
6 multicast VPI uniquely associated with said multicast output
7 port; and
8 establishing a set of VCIs.

1 10. The method for virtual path switching of claim 9
2 further comprising assigning said multicast VPI to said data
3 cell, and assigning a VCI from said set of VCIs to said data
4 cell.

1 11. The method for virtual path switching of claim 10
2 wherein said transferring step comprises transferring said
3 data cell to said multicast output port uniquely associated
4 with said assigned multicast VPI.

1 12. The method for virtual path switching of claim 11
2 further comprising:
3 receiving said data cell by said multicast module
4 associated with said multicast output port;

HUB
AB

5 examining said assigned VCI to determine a multicast
6 group of VPis from said set of VPis;
7 reproducing said data cell to create a predetermined
8 number of reproduced data cells; and
9 reassigning each of said reproduced data cells with a new
10 VPI from said multicast group of VPis.

1 13. The method for virtual path switching of claim 12
2 wherein said examining step comprises indexing a memory
3 storing said multicast group of VPis.

1 14. The method for virtual path switching of claim 13
2 comprising:
3 receiving each of said reproduced data cells from said
4 multicast module at one of said input ports;
5 examining each of said reassigned VPis to determine a new
6 output port corresponding to each of said reassigned VPis; and
7 transferring each of said reproduced data cells to said
8 new output port corresponding to each of said reassigned VPis.

1 15. The method for virtual path switching of claim 14
2 wherein said reproducing step comprises creating at least as
3 many reproduced data cells as there are distinct VPis in said
4 multicast group of VPis.

1 16. The method for virtual path switching of claim 14
2 further comprising reassigning the VCI of least one of said

3 reproduced data cells.

SUB A1

1 17. The method for virtual path switching of claim 3
2 wherein said step of assigning comprises assigning an
3 externally managed VPI and an externally managed VCI, and
4 wherein said step of examining comprises examining said
5 assigned externally managed VPI in said data cell to determine
6 a destination output port associated with said assigned
7 externally managed VPI.

555260-8034460

1 18. The method for virtual path switching of claim 17
2 further comprising:
3 providing at least one input routing table having memory
4 locations storing routing tags, wherein said examining step
5 further comprises examining said assigned externally managed
6 VPI to determine a memory location in said at least one input
7 routing table; and
8 transferring said data cell to an output port represented
9 by the routing tag contained in said memory location.

SUB B15

1 19. In a processing satellite communications system
2 including at least one processing satellite having a receiver
3 and a transmitter for respectively receiving and transmitting
4 a data cell, a method for expanded address virtual path
5 switching of said data cell, the method comprising:
6 receiving a data cell at one of a plurality of input
7 ports of a processing satellite;

8 examining an assigned virtual path identifier (VPI) in
 9 said data cell to determine a destination output port;
 10 attaching a selected routing tag to said data cell, said
 11 routing tag identifying a next virtual channel link; and
 12 transferring said data cell to said destination output
 13 port.

1 20. The method for virtual path switching of claim 19
 2 further comprising:
 3 assigning said assigned VPI to said data cell; and
 4 assigning a virtual channel identifier (VCI) to said data
 5 cell.

1 21. The method for virtual path switching of claim 20
 2 further comprising:
 3 establishing at least two VPIs corresponding to a single
 4 output port; and
 5 establishing a set of VCIs.

1 22. The method for virtual path switching of claim 19
 2 further comprising storing routing tags in an input routing
 3 table, and wherein said step of examining further comprises
 4 determining said selected routing tag.

1 23. An apparatus for path switching a data cell to a
 2 satellite output port for transmission in a downlink, the
 3 apparatus comprising:

4 an input module comprising a plurality of input ports;
 5 an output module comprising a plurality of output ports;
 6 and
 7 circuitry responsive to address bits in a data cell and
 8 to an assignment of said address bits to said output ports,
 9 for coupling said data cell to at least one of said output
 10 ports.

1 24. The apparatus for path switching of claim 23 wherein
 2 said data cell is an ATM cell.

1 25. The apparatus for path switching of claim 23 further
 2 comprising an examining circuit for examining a virtual path
 3 identifier (VPI) in said data cell.

1 26. The apparatus for path switching of claim 23 wherein
 2 said address bits include at least a portion of a virtual path
 3 identifier (VPI).

1 27. The apparatus for path switching of claim 26 wherein
 2 said address bits further include at least a portion of a
 3 virtual channel identifier (VCI).

1 28. The apparatus for path switching of claim 26 wherein
 2 said assignment includes an assignment of an output port
 3 associated with at least two VPIs.

1 29. The apparatus for path switching of claim 23 wherein
2 said circuitry is further responsive to a control subfield and
3 a routing subfield, said control subfield indicating special
4 treatment of said data cell.

1 30. The apparatus for path switching of claim 23 further
2 comprising at least one multicast module connected between
3 said input module and said output module.

1 31. The apparatus for path switching of claim 30 further
2 comprising at least one multicast routing table connected to
3 said multicast module, said multicast routing table containing
4 multicast group information.

1 32. The apparatus for path switching of claim 23 wherein
2 at least one of said output ports is associated with a
3 crosslink to another processing satellite.